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MONITORING COASTAL WATER PROPERTIES
AND CIRCULATION FROM ERTS-1

(E73-11164) MONITORING COASTAL WATER
PROPERTIES AND CIRCULATION FROM ERTS-1
Report on Significant Results (Delaware
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Report on Significant Results

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7. Under atmospheric conditions encountered along the East Coast of the United States MSS band 5 seems to give the best representation of sediment load in the upper one meter of the water column. Band 4 is masked by haze-like noise, while band 6 does not penetrate sufficiently into the water column.
8. In the ERTS-1 imagery the sediment patterns are delineated by only three to four neighboring shades of grey. The digital tapes permit better grey scale discrimination of suspended matter.
9. Negative transparencies of the ERTS-1 images give better contrast whenever the suspended sediment tones fall within the first few steps of the grey scale. Considerable improvement in contrast can be obtained by more careful development of film and prints.
10. Color density slicing helps delineate the suspended sediment patterns more clearly and differentiate turbidity levels. Density slicing of all four MSS bands gave an indication of relative sediment concentration as a function of depth, since the four bands penetrate to different depths ranging from several meters to several centimeters, respectively.
11. Sediment pattern enhancements obtained by additive color viewing of the four ERTS-1 MSS band transparencies did not noticeably improve the contrast shown above that seen in the best band, i.e., MSS band 5. However, digital multispectral enhancement techniques are providing improved thematic maps.
12. Five papers and articles have been published based on ERTS-1 results on coastal dynamics and water properties. Three more papers were prepared on coastal vegetation and land use.

ERTS-1 I.D. Numbers

1024 - 15073	1205 - 15141
1079 - 15133	1313 - 15141
1133 - 15141	1349 - 15134
1187 - 15140	1402 - 15071

SIGNIFICANT RESULTS

1. The following water properties have been identified and studied synoptically over Delaware Bay and the continental shelf:
 - a. Suspended Sediment (Turbidity) Concentration and Patterns
 - b. Current Circulation Patterns
 - c. Water Mass Boundaries
 - d. Waste Disposal Plumes
2. Photographs and digital tapes from eight successful ERTS-1 overpasses and nine major aircraft overflights are being correlated with ground truth data measured during twelve boat/helicopter transects, including:
 - a. Secchi depth
 - b. Suspended sediment concentration and size
 - c. Alpha obtained with transmissometer
 - d. Temperature
 - e. Salinity
 - f. Current velocity
 - g. Water color
3. Grey tone (microdensitometer trace) of ERTS-1 imagery correlates well with a Secchi disk and water sample analysis of sediment concentration. Sediment concentration maps are being plotted automatically by injecting ground truth into MSS tape printouts.
4. Circulation patterns observed by ERTS-1, using suspended sediment as a natural tracer, agree well with predicted and measured currents throughout Delaware Bay. ERTS-1 imagery is being used to extend and verify a predictive model for oil slick movement in Delaware Bay. During flood tide the suspended sediment as visible from ERTS-1 correlated well with the depth profile throughout Delaware Bay. No such correlation was found during ebb tide.
5. Convergent shear boundaries between different water masses have been observed from ERTS-1, with foam lines containing high concentrations of lead, mercury and other toxic substances.
6. Acid disposal plumes have been monitored 36 miles off Delaware's Atlantic coast. Since the acid changes from greenish to brownish upon exposure to seawater, the ratio of the signal in the green band to that in the red band may give an indication of when the acid was dumped. Thus the temporal change is being used to supplement the spectral signature of the plume.

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Recent Papers

1. Szekiolda, K. H., Kupferman, S. L., Klemas, V., Polis, D. F., Element Enrichment in Organic Films and Foam Associated with Aquatic Frontal Systems, Journal of Geophysical Research, Volume 77, No. 27, September 20, 1972.
2. Klemas, V., Detecting Oil in Water, Instrumentation Technology, September, 1972.
3. Klemas, V., Srna, R., and Treasure, W., Investigation of Coastal Processes Using ERTS-1 Satellite Imagery, American Geophysical Union Annual Fall Meeting, San Francisco, California, Dec. 4-7, 1972.
4. Klemas, V., Daiber, F., Bartlett, D., Crichton, O., Fornes, A., Application of Automated Multispectral Analysis to Delaware's Coastal Vegetation Mapping, American Society of Photogrammetry Annual Meeting, Washington, D. C., March 11-16, 1972.
5. Klemas, V., Daiber, F., Bartlett, D., Identification of Coastal Vegetation Species in ERTS-1 Imagery, NASA ERTS-1 Symposium on Significant Results, Washington, D. C., March 5-9, 1973.
6. Klemas, V., Treasure, W., and Srna, R., Applicability of ERTS-1 Imagery to the Study of Suspended Sediment and Aquatic Fronts NASA ERTS-1 Symposium on Significant Results, Washington, D. C., March 5-9, 1973.
7. Kupferman, S., Klemas, V., Polis, D., and Szekiolda, K., Dynamics of Aquatic Frontal Systems in Delaware Bay, A.G.U. Meeting, Washington, D. C., April 16-20, 1973.
8. Klemas, V., Srna, R., Treasure, W., Assessment of Sediment Dispersal Patterns on Delaware Bay by Use of ERTS-1 Satellite Imagery, International Symp. on Interrelationships of Estuarine and Continental Shelf Sedimentation, Bordeaux, France, July 9-14, 1973.
9. Klemas, V., (Invited Paper) Requirements for Laser Systems Used in Coastal Investigations, Conference on the Use of Lasers for Hydrographic Studies, Wallops Island, Va. September 12, 1973. (Sponsors NASA, NOAA, EPA, NAVY).
10. Klemas, V., Borchardt, J. F., Treasure W. M., Suspended Sediment Observations from ERTS-1, Remote Sensing of Environment, Vol.2, 1973.
11. Klemas, V., Srna, R., Treasure, W., and Rogers, R., Satellite and Aircraft Studies of Suspended Matter and Aquatic Interfaces in Delaware Bay, A.S.P. Symposium on Remote Sensing in Oceanography, Orlando, Florida, Oct. 2-5, 1973.
12. Klemas, V., Bartlett, D., Daiber, F., Mapping Delaware's Coastal Vegetation and Land Use from Aircraft and Satellites, A.S.P., Symposium on Remote Sensing in Oceanography, Orlando, Fla., Oct. 2-5, 1973.
13. Klemas, V., (Invited Paper) Satellite Studies of Turbidity, Waste Disposal Plumes and Pollution - Concentrating Water Boundaries, Second Conference on Environmental Quality Sensors, National Environmental Research Center, Las Vegas, Nevada, October 10, 1973. (Sponsor EPA).